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EXAMINER

LEE, PING

ART UNIT

PAPER NUMBER

2644

DATE MAILED: 12/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/277,013

Applicant(s)

BAUCK, JERALD L.

Examiner

Ping Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claim 14 is objected to because of the following informalities: in lines 15-16, "the speaker layout" should be corrected as --a speaker layout--, and line 25, "the plurality of speakers" should be corrected as --a plurality of speakers--. Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 25 and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 25, the phrase "the plurality of other listeners" defined on last two lines of the claim lacks clear antecedent basis.

Regarding claim 27, the phrase "the plurality of listeners in the second space" defined on last two lines of the claim lacks clear antecedent basis.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 11-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cooper et al (US005333200A).

Cooper et al (hereafter Cooper) discloses, Fig. 10b in view of Figs. 10a, 8b and 1c, the method of substantially recreating a binaural impression of a sound perceived by a first listener from an audio source for a plurality of other listeners comprising the steps of determining a first transfer function matrix (Fig. 8b); determining a second transfer function matrix (Fig. 1c); solving for a transfer function matrix (Fig. 10b) using the first transfer function matrix (Fig. 8b) and the second transfer function matrix (Fig. 1c); and processing an input audio signal (as shown input at the top of the circuit a shown in Fig. 10b) and supplying the processed audio signal to a set of speakers (col. 18, line 55).

Regarding claims 11-13, Cooper fails to explicitly show the plurality of other listeners at locations different from the location of the first listener. Cooper teaches, in Fig. 10b, a method for recreating the binaural impression for a single second listener in a location that is different from the location of the first listener. However, Cooper suggests that there is a need to modify the reformatter for two listeners listening the audio signal simultaneously (col. 24, lines 26-31). Based Cooper's disclosure, the transfer functions A and S are functions depending on the location of a listener in a space (see Fig. 1B for illustrating the relationship between the ears and S and A). The transfer functions A and S are functions for the particular listener at the particular location. For each additional listener, one skilled in the art would have expected that a different set of transfer functions A and S should be used to take into consideration the location(s) of the additional listener(s). In other words, the same reformatter as shown

in Fig. 10b could be duplicated for each additional second listener. Of course, the transfer functions A and S have to be adjusted if the speaker bearing angles are different for each second listener. Thus, it would have been obvious to one of ordinary skill in the art to modify Cooper's method by duplicating this method for more than one other listener at locations different from the first listener's in order to allow more than one listener to simultaneously recreate the same binaural impression for the first listener.

Claims 14, 17 and 18 are similar to claim 13. The common elements would not be discussed further. The differences will be addressed. The claimed "a speaker layout of the first listener" reads on Fig. 10b of Cooper, wherein the speakers are having 30° angle. The claimed "the speaker layout at the ears of each listeners of the plurality of listeners" reads on the speaker having 15° angle.

Regarding claims 15 and 16, Cooper clearly shows how to remove the cross-talk cancellation from the first set of spatially formatted audio signals to recover a stereo signal (Fig. 10b is a modified version of Fig. 10a, the output from 402 in Fig. 10a is a binaural signal with the cross-talk cancellation removed).

Regarding claim 19, Cooper discusses that the simulated space (col. 18, lines 60-61; wherein the actual speakers are in 30° angle to simulate 50° angle).

Regarding claims 20 and 21, Cooper shows the method of recreating an acoustic perception of a listener in a first space (space with loudspeakers at +/- 30°) for a listener in a second space (space with loudspeakers at +/- 15°) in Fig. 15. Although Fig. 15 fails to explicitly show the signals to be applied to each speaker, in view of the

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disclosure of col. 18-19 in combination Fig. 15, in view of Figs. 10a, 10b, 8b and 1c, one skilled in the art would be able to determining a second matrix of transfer functions (Fig. 8b); determining a first matrix of transfer functions (col. 18, line 65); determining a fourth matrix of transfer function (Figs. 10a and 10b) using the first, second and third matrices; processing an input audio signal and supplying the processed audio signal to a set of speakers (col. 18, line 55), in order to reformat the input signals (Ls, Rs; col. 18, lines 60-63) to recreate sources at a location (the example provided by Cooper is $\pm 50^\circ$) other than the location of the speakers for the first listener.

Although Cooper fails to explicitly show the specific equations for a system involving more than four loudspeakers, Cooper discusses the possibility of using more than four speakers (col. 24, line 26; "Four-loudspeakers (and larger number)") after clearly teaches how to derive a two-speaker or four-speaker system. Thus, it would have been obvious to one of ordinary skill in the art to modify Cooper's method for a system involving more than four speakers as suggested in order to recreate the same perception as the first listener in an environment having more than four speakers.

Regarding claim 22, Cooper shows the product of two matrices (comparing Fig. 10b with Fig. 10a).

Regarding claim 23, Cooper shows the sum or difference of two matrices (col. 22, lines 3-56).

Regarding claim 24, Cooper shows the realizable and stable filter elements (Figs. 6 and 7) for the embodiment shown in Fig. 1c. Although Cooper fails to explicitly show how to use those elements for the embodiment shown in Fig. 15, Fig. 15 nevertheless is

the modification of several embodiments including the one shown in Fig. 1c. Therefore, one skilled in the art would be able to implement a part of the fourth matrix using realizable and stable filter elements as suggested in Fig. 1c without any undue experience.

Regarding claims 25 and 27-30, the modified Cooper as discussed above for claims 11 and 14 is method of recreating one or more acoustic perception of a single listener in a first space for more than one listener in a second space, but fails to show there is more than one listener in a first space. Cooper teaches on col. 18, lines 59-68 that the loudspeakers in the first space could be mounted at $\pm 30^\circ$. However, this is merely an example. The loudspeakers in the first space could be mounted in other reasonable orientations, or the user can be located at a different position with the respect to a pair of fixed speakers. By fixing the filter coefficients in 402 of Fig. 10a for a particular orientation, one skilled in the art would have expected that Cooper's reformatter would be limited to only one orientation. By measuring several set of transfer functions for a listener in the first space with a plurality of different speaker orientations or a plurality of different listener's locations with a pair of fixed speakers and allow the user to select the speaker or listener's orientation in the first space to be recreate, one skilled in the art would have expected that the listener in the second space could have more freedom of selecting the perception to be recreated.

Based on Cooper's disclosure, the transfer functions A and S are functions depending on the first listener's location, which could be varied, in the first space. The transfer functions A and S are functions for the single listener in the particular location in

the first space. For additional listener(s) (or addition locations) in the first space; one skilled in the art would have expected that a different set of transfer functions A and S should be used depending on the location(s) of each additional listener(s) in the first space.

Thus, it would have been obvious to one of ordinary skill in the art to modify Cooper's method by determine the second matrix of transfer functions for each listener among plurality of listeners in the first space with speakers in the first space mounting in different orientation in order to allow the listeners in the second space to select one of perceptions of a listener in the first space.

Regarding claim 26, Cooper shows the first space and second space are anechoic space.

Claim 31 is similar to claim 20 with the exception of "at least three loudspeakers in the second space". Since claim 20 defines more than four loudspeakers, the limitation in claim 31 is inherently met. The claimed limitation that the plurality of listeners in both first and second space will be discussed in more detail. As indicated by Cooper, there is a need to use four speakers for a plurality of listener in the second space (col. 24, lines 26-31) listening to the program simultaneously. Cooper teaches how to map the transfer function for a listener in a first space for a listener in a second space (Fig. 10b). One skilled in the art would be able to map the same transfer function for a listener in a first space for a plurality of listener in a second space by providing additional set of A and S for each listener in the second space. Cooper also teaches how to determine different set of transfer function of different speaker orientations for

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the listener in the first space. See Fig. 9. Cooper defines the speaker mounting angle. One skilled in the art would be able to realize the same angle could be interpreted as different listener's location. For example, with the same set of speakers, a listener sitting close to the speaker will have a different perception angle than the listener sitting further away from the speaker set. Thus, it would have been obvious to one of ordinary skill in the art to further modify Cooper's method by determining the set of A and S transfer function for each listener in the first space and the set of A and S transfer function for each listener in the second space in order to allowing each listener in the second space to select one of a plurality of perception perceived by a plurality of listeners in the first space.

Regarding claim 32, Cooper shows in Fig. 14 how to determine the fourth matrix to least three speakers in the second space and the second listener is not located symmetrically with respect to the at least three speakers.

Response to Arguments

6. Applicant's arguments filed 10/17/05 have been fully considered but they are not persuasive.

On p. 16, applicant argued that claim 14 clearly requires that the speaker layout in the first space be the same as the speaker layout in the second space.

Referring to claim 14, the argued limitation is clearly not positively recited in the claim. Therefore, the argument is baseless. In terms of having a plurality of listeners in the second space, Cooper provides the suggestion for doing so in col. 24, lines 26-31.

Therefore, it would have been obvious to modify the method for a listener in a second space to a plurality of listeners in the second space as suggested by Cooper.

On p. 17, applicant argued that examiner fails to provide clear explanation for claim 19.

Cooper discusses that the simulated space, wherein the actual speakers are in 30° angle and the simulated angle is 50° (col. 18, lines 60-61;). This reads on the claimed simulated space having simulated speaker angle.

On p. 17, applicant argued that claim 20 requires more than four speakers.

Cooper positively suggests to having more than four speakers on col. 24, line 26.

On p. 17, applicant argued that Cooper fails to show sum or differences of two matrices.

As long as Cooper shows that sum or difference has been performed among matrices, the limitation is met.

On p. 18, applicant argued that Cooper fails to show having one or more acoustic perceptions be recreated simultaneously for claim 25.

The claimed limitation is one or more acoustic perceptions be recreated simultaneously. Since Cooper clearly shows recreating one acoustic perception, the claimed limitation is met.

On p. 19, applicant argued that claimed invention cannot be met with the proposed two speakers and four ears (assuming it means two listeners).

On col. 24, lines 26-31, Cooper teaches a scenario that for recreating the perception without stereo-field reversal. Cooper suggests four or more loudspeakers be

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used for more than one listener. For a specific example, Cooper teaches four speakers for two listeners. Therefore Cooper suggests how to modify the two speakers layout for a single listener to four or more speakers for two or more listeners.

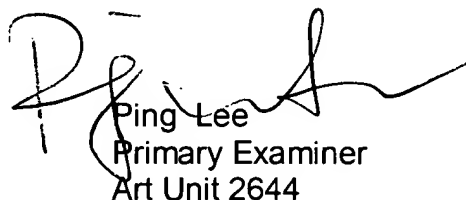
On p. 20, applicant argued that examiner fails to take into consideration that additional crosstalk path being created between unpaired speakers and ears.

Based on the teaching discussed in col. 24, lines 26-31 of Cooper, Cooper implies that one skilled in the art would and should be able to derive the transfer function to cancel the additional crosstalk.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ping Lee whose telephone number is 571-272-7522. The examiner can normally be reached on Monday and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian C. Chin can be reached on 571-272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Ping Lee
Primary Examiner
Art Unit 2644

pwl